REMARKS

Claims 1-5 and 7-48 are pending. Claims 1, 9, 22, 35 and 41 have been amended. The paragraph beginning at page 7, line 16 of the specification has been amended. No new matter has been added.

Applicants representative wishes to thank the Examiner for the telephone interview on February 13, 2003. To clarify the claimed subject matter, it was agreed that independent claims 1, 9, 22, 35 and 41 would be amended to include the limitations of claim 6. The Examiner indicated that if such an amendment were made that he might reconsider the application.

In view of the amendments above and the remarks below, Applicants request that all claims be allowed.

Section 1 of the Office action states that claims l-48 are rejected under 35 U. S. C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as his invention.

Claim 1 has been amended to clarify the correlation between the elements. In particular, claim 1 recites an optical isolator core that includes a rotator and a second polarizer having a wedge shape and disposed along the path and "between the first polarizer and the rotator." Moreover, claim 1 has been amended to recite a correction element of birefringent material, disposed along the path "and adjacent to a vertical face of the second polarizer." Support for this amendment can be found, for example, in FIG. 2. No new matter has been added.

Likewise, claim 9 has been amended to clarify the correlation between the elements. In particular, claim 9 recites an optical isolator that includes a rotator and a second polarizer having a wedge shape and disposed along the path "and between the first polarizer and the polarization rotator." Moreover, claim 9 has been amended to recite a correction element, disposed along the path "and

adjacent to a diagonal face of the second polarizer." Support for this amendment can be found, for example, in FIG. 2. No new matter has been added.

Similarly, claim 22 has been amended to clarify the connection between the elements. In particular, claim 22 recites an optical isolator that includes a second polarizer, having a wedge shape and disposed along the path "and between the first polarizer and the polarization rotator." Claim 22 also has been amended to recite a correction element, disposed along the path "and adjacent to a diagonal face of the second polarizer." Support for this amendment can be found, for example, in FIG. 2. No new matter has been added.

Claims 35 and 41 have been amended in a similar manner as claim 1.

In light of the above amendments and remarks, Applicants respectfully request withdrawal of this rejection.

Section 3 of the Office action states that claims 35-38 and 41-43 and 48 are rejected under 35 U. S. C. 102(b) as being anticipated by Matsui ('245).

Claims 35 and 41 have been amended in a similar manner as claim 1. Consequently, Applicants respectfully request that this rejection be withdrawn.

Section 4 of the Office action states that claims 35-48 are rejected under 35 U. S. C. 102(b) as being anticipated by Konno et al ('264).

Claims 35 and 41 have been amended in a similar manner as claim 1. Consequently, Applicants respectfully request that this rejection be withdrawn.

Section 5 of the Office action states that claims 35-48 are rejected under 35 U. S. C. 102(b) as being anticipated by Nakamura ('892).

Claims 35 and 41 have been amended in a similar manner as claim 1. Consequently, Applicants respectfully request that this rejection be withdrawn.

Section 6 of the Office action states that claims 35- 48 are rejected under 35 U. S. C. 102(b) as being anticipated by MacArthur ('058).

Claims 35 and 41 have been amended in a similar manner as claim 1. Consequently, Applicants respectfully request that this rejection be withdrawn.

Section 7 of the Office action states that claims 35-48 are rejected under 35 U. S. C. 102(b) as being anticipated by Matsumato et al (' 329).

Claims 35 and 41 have been amended in a similar manner as claim 1. Consequently, Applicants respectfully request that this rejection be withdrawn.

Section 8 of the Office action states that claims 9-11, 15-24 and 27-34 are rejected under 35 U. S. C. 102(b) as being anticipated by Masuda et al. (' 431).

The Office action has indicated that claims 1-8 are not anticipated by the '431 patent. Accordingly, claim 9 has been amended to incorporate a feature from claim 1 that is not taught or suggested by the '431 patent. Specifically, claim 1 has been amended to recite an optical isolator that includes first and second polarizers and a correction element having a length and a crystal optic, "wherein the length and the crystal optic axis angle are chosen to compensate for differential group delay and walk-off introduced by the first and the second polarizers." Thus, claim 9, as well as dependent claims 10-11, should be allowable for at least the same reasons as claim 1.

Likewise, claim 22 has been amended to recite an optical isolator that includes first and second polarizers and a correction element having a length and a crystal "wherein the length and the crystal optic axis angle are chosen to compensate for differential group delay and walk-off introduced by the first and the second polarizers." Thus, claim 22, as well as 23-24 and 27-34, should be allowable for at least the same reasons as claim 1.

Consequently, Applicants respectfully request that this rejection be withdrawn.

Section 9 of the Office action states that claims 1, 2, 5-11, 15-24 and 27-48 are rejected under 35 U. S. C. 102(b) as being anticipated by Swan ('771).

Applicants respectfully assert that Swan does not teach or suggest all of the limitations of claim 1.

The Swan patent discloses an optical isolator 10 that includes compensating plate 22 having a C-axis angle of –22.5 degrees with respect to a plate edge 25 of a plate front face 24 of the plate. (*See* col. 7, lines 6-20 and FIG. 1) Referring to FIGS. 2 and 3, the plate 22 is characterized as having a length L and extends at a tilt angle θ with respect to a plane normal to a reference axis that forms an extension of an incoming ray R1.

Claim 1 of the present invention recites an optical isolator that includes a correction element having a length and an optic axis angle, wherein the length and the correction element optic axis angle compensates for differential group delay and walk-off introduced by the first and the second polarizers. To clarify the subject matter, claim 1 has been amended to clarify the features of the correction element wherein:

> the correction element includes an optical plane in which said o-rays and said e-rays travel, wherein said optical plane is perpendicular to said optic axis of said second polarizer, and an input face of the correction element being parallel to an input face of the second polarizer such that the optical plane of the correction element is perpendicular to the optic axis of the second polarizer.

In other words, the correction element has an optic axis that compensates for differential group delay and walk-off and the correction element is parallel to the second polarizer. For example, in one embodiment of the present invention, FIG. 3 shows a correction element 212 having an optic axis C with an angle α. By optimizing the optic axis C having an angle α and the length L, both polarization mode dispersion (PMD) (i.e. differential group delay (DGD)) and walk-off can be improved. (*See* page 8, lines 10-12 of the present application) Referring to FIG. 2, the displacement of the e- and o-rays in space (walk-off) introduces insertion loss and polarization dependent loss (PDL) in the isolator in the forward path. In addition, the fact that the two beams are traveling different optical paths results in the two beams having different velocities when passing through the isolator. (*See* page 3, lines 3-9 of the present application)

FIG. 4 shows that the correction element 212 includes an optical plane P in which said o-rays and said e-rays travel such that the optical plane P is perpendicular to the

optic axis of the second polarizer 210. FIG. 3 shows an input face 213 of the correction element being parallel to an input face of the second polarizer 210 such that the optic axis of the correction element 212 is perpendicular to the second polarizer 210. The techniques of the claimed invention may include advantages such as the reduction of various negative optical effects including PMD, DGD as well as insertion loss. (See page 11, lines 1-5 of the present application)

The Swan patent does not teach or suggest every limitation of claim 1. In particular, the Swan patent fails to recite an optical isolator that includes a correction element having an arrangement as quoted above in claim 1. In contrast to the present invention, FIGS. 2 and 3 of the Swan patent show that the plate 22 has a **fixed** optic axis C with an angle of –22.5 and that the plate needs to be physically **tilted** according tilt angle θ. (*See* column 7, line 48 to column 8, line 25) In the claimed invention, the "input face of the correction element being parallel to an input face of the second polarizer such that the optic axis of the correction element is perpendicular to the second polarizer" as recited in claim 1. In contrast, the Swan patent shows a plate 22 having a face 24 that is not parallel to a face of element 16, instead the plate is **tilted** according to angle θ and is not capable of being parallel as recited in claim 1 of the present invention. In other words, the structure of the Swan patent is not equivalent to the arrangement in the claimed invention, particularly the quoted structure in claim 1 related to the correction element.

Moreover, the Swan patent goes on to explain that such an arrangement still suffers from various problems. For example, it states that:

> Observation of FIG.2 will further reveal that the tilt angle θ is such that the absolute value of the deflection for each of the rays R1 and R2 is actually increased as the offset Δy is being eliminated relative to that which would be experienced without the tilt. **Nevertheless, all attempts at finding a tilt angle that will bring the rays R1 and R2 into coincidence not only with another but also with the reference axis, without jeopardizing the polarization dispersion compensation, have been unsuccessful**. Indeed, it appears that the polarization

dispersion compensation and the reference axis coincidence are inversely related in the sense that steps take to improve one worsen the other.

(Emphasis added, See column 8, lines 48-59)

In other words, the Swan Patent fails "to compensate for differential group delay **and** walk-off" as well as not having a correction element wherein:

the correction element includes an optical plane in which said o-rays and said e-rays travel, wherein said optical plane is perpendicular to said optic axis of said second polarizer, and an input face of the correction element being parallel to an input face of the second polarizer such that the optic axis of the correction element is perpendicular to the second polarizer.

The Swan patent attempts to be compensate for walk-off by providing a compensation plate 22 that needs to be tilted by tilt angle θ, whereas in the present invention, the length and "the correction element optic axis angle compensates for differential group delay and walk-off " as recited in claim 1. In other words, compensation plate 22, in the Swan Patent, has a **fixed** optic axis C that selected **independent** of the differential group delay and walk-off **and** such that the plate needs to be **tilted**, whereas, in the present invention, the correction element **has an optic axis angle** that compensates for differential group delay and walk-off such that the element does **not** need to be tilted. In addition, as mentioned above, the Swan patent shows a plate 22 having a face 24 that is **not** parallel to a face of element 16, instead the plate 22 is tilted according to angle θ. Such a structure is not capable of being parallel as the indicated by the quoted structure above related to the correction element of claim 1 of the present invention. In other words, the structure of the Swan patent is not equivalent to the structure of the claimed invention.

Thus, the Swan patent does not teach or suggest every limitation of claim 1. Therefore, claims 2, as well as depend claims 5-8 should be allowable for at least the same reasons.

Similarly, independent claim 9 has been amended to recite a method for aligning an optical element that includes providing a cylinder having a lens disposed therein, and a

module having an optical filter disposed therein. Claim 12 should be allowable for at least the same reasons as claim 1.

Likewise, claim 22 has been amended in a similar manner to claim 1. Thus, claim 1 as well as claims 23-24 and 27-34 should be allowable for at least the same reasons as claims 1.

Independent claims 35 and 41 have been amended in a similar manner to claim 1. Thus, claims 35 and 41 as dependent claim should be allowable for at least the same reasons as claims 1.

Applicants submit that their amendment and remarks overcome this rejection and request that this rejection be withdrawn.

Section 11 of the Office action states that claims 3, 4, 12-14, 25 and 26 are rejected under 35 U. S. C. 102(b) as anticipated by, or in the alternative, under 35 U.S.C. 103(a) as obvious over Swan ('771).

Independent claim 1 is patentably distinct over Swan as explained above in section 11. Accordingly, dependent claims 3, 4, 12-14 should be allowable for at least the same reasons.

Likewise independent claim 9 should be allowable for at least the same reasons as explained above. Accordingly, dependent claims 12-14 should be allowable for at least the same reasons.

Likewise independent claim 9 should be allowable for at least the same reasons as explained above. Accordingly, dependent claims 25 and 26 should be allowable for at least the same reasons.

Applicants respectfully request that this rejection be withdrawn.

Section 12 of the Office action states that claims 9-12, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsui ('245) in view of Official Notice.

The Office action has indicated that claims 1-8 are not anticipated by the '245

patent. Accordingly, claim 9 has been amended to incorporate a feature from claim 1 that is not taught or suggested by the '245 patent. Specifically, claim 1 has been amended to recite an optical isolator that includes first and second polarizers and a correction element having a length and a crystal optic, "wherein the length and the crystal optic axis angle are chosen to compensate for differential group delay and walk-off introduced by the first and the second polarizers." Thus, claim 9 should be allowable for at least the same reasons as claim 1.

Applicants respectfully submit that their amendment and remarks overcome this rejection and request that this rejection be withdrawn.

Section 13 of the Office action states that claims 9-12, 15-25 and 27-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konno ('264) in view of Official Notice.

The Office action has indicated that claims 1-8 are not anticipated by the '264 patent. Accordingly, claim 9 has been amended to incorporate a feature from claim 1 that is not taught or suggested by the '264 patent. Specifically, claim 1 has been amended to recite an optical isolator that includes first and second polarizers and a correction element having a length and a crystal optic, "wherein the length and the crystal optic axis angle are chosen to compensate for differential group delay and walk-off introduced by the first and the second polarizers." Thus, claim 9 should be allowable for at least the same reasons as claim 1.

Claim 22 has been amended in a similar manner. Thus, claim 22 should be allowable for at least the same reasons as claim 1.

Applicants respectfully submit that their amendment and remarks overcome this rejection and request that this rejection be withdrawn.

Section 14 of the Office action states that claims 9-26 and 28-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura ('892) in view of Official Notice.

The Office action has indicated that claims 1-8 are not anticipated by the '892 patent. Accordingly, claim 9 has been amended to incorporate a feature from claim 1 that is not taught or suggested by the '892 patent. Specifically, claim 1 has been amended to recite an optical isolator that includes first and second polarizers and a correction element having a length and a crystal optic, "wherein the length and the crystal optic axis angle are chosen to compensate for differential group delay and walk-off introduced by the first and the second polarizers." Thus, claim 9 should be allowable for at least the same reasons as claim 1.

Claim 22 has been amended in a similar manner. Thus, claim 22 should be allowable for at least the same reasons as claim 1.

Applicants respectfully submit that their amendment and remarks overcome this rejection and request that this rejection be withdrawn.

Section 15 of the Office action states that claims 9-26 and 28-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacArthur ('058) in view of Official Notice.

The Office action has indicated that claims 1-8 are not anticipated by the '058 patent. Accordingly, claim 9 has been amended to incorporate a feature from claim 1 that is not taught or suggested by the '058 patent. Specifically, claim 1 has been amended to recite an optical isolator that includes first and second polarizers and a correction element having a length and a crystal optic, "wherein the length and the crystal optic axis angle are chosen to compensate for differential group delay and walk-off introduced by the first and the second polarizers." Thus, claim 9 should be allowable for at least the same reasons as claim 1.

Claim 22 has been amended in a similar manner. Thus, claim 22 should be allowable for at least the same reasons as claim 1.

Applicants respectfully submit that their amendment and remarks overcome this rejection and request that this rejection be withdrawn.

Section 16 of the Office action states that claims 9-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumoto ('329) in view of Official Notice.

The Office action has indicated that claims 1-8 are not anticipated by the '329 patent. Accordingly, claim 9 has been amended to incorporate a feature from claim 1 that is not taught or suggested by the '329 patent. Specifically, claim 1 has been amended to recite an optical isolator that includes first and second polarizers and a correction element having a length and a crystal optic, "wherein the length and the crystal optic axis angle are chosen to compensate for differential group delay and walk-off introduced by the first and the second polarizers." Thus, claim 9 should be allowable for at least the same reasons as claim 1.

Claim 22 has been amended in a similar manner. Thus, claim 22 should be allowable for at least the same reasons as claim 1.

Applicants respectfully submit that their amendment and remarks overcome this rejection and request that this rejection be withdrawn.

Section 17 of the Office action objects to the disclosure for informalities.

The paragraph beginning on page 7, line 16 has been amended to provide a written description of the reference $\theta 2$ shown in FIG. 2. No new matter has been added

Applicants respectfully submit that their amendment and remarks overcome this rejection and request that this rejection be withdrawn.

Section 18 of the Office action objects to the specification for lacking antecedent basis for the claimed subject matter.

The applicants respectfully point out that the application, including the specification, the drawings and the claims, provide antecedent basis for the claimed subject matter identified by the Office Action. In particular, the two polarizers can have optical axes C1 and C2 that 45° apart. (See page 7, lines 16-19 of the present

application) In addition, the difference between the two optic axes may be equal approximately 45°. In another aspect of the isolator core, the angles of both polarizers 206 and 210 are substantially equal. Therefore, the specification provides support for a first polarizer 206 having an optic axis of plus or minus 45° and a second polarizer 210 having an optic axis of 0 or 90°.

Applicants respectfully request that this objection be withdrawn.

Section 19 of the Office action objects to the drawings because they do not show every feature of the invention specified in the claims.

The applicants respectfully point out that the drawings show every feature of the invention specified in the claims. FIG. 2 shows a first polarizer 206 having an optic angle C1 with an angle $\gamma 1$ and a second polarizer 210 having an optic angle C2 with an angle $\gamma 2$. As mentioned above in section 18 of the response, the specification provides support for provides support for a first polarizer having an optic axis of plus or minus 45° and a second polarizer having an optic axis of 0 or 90°. Thus, the drawings show every feature of the invention specified in the claims.

Applicants respectfully request that this objection be withdrawn.

Applicants respectfully submit that their amendment and remarks overcome t his rejection and request that this rejection be withdrawn.

Applicant asks that all claims be allowed. Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: 2/19/03

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